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TITLE: STRUCTURAL MATERIAL, PRODUCTION OF STRUCTURAL MATERIAL AND INTERIOR MATERIAL FOR VEHICLE

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ABSTRACT:

PURPOSE: To obtain a lightweight structural material having high rigidity, formable even at a low temperature or room temperature and useful as an interior material for vehicle by impregnating a polyhydric phenol-aldehyde condensate in fibers and curing the condensate simultaneously with thermal forming.

CONSTITUTION: The objective structural material is produced by impregnating (A) jute fibers or a mixture of jute fibers and other fibers with (B) a polyhydric phenol-aldehyde condensate and optionally (C) a curing agent (preferably hexamethylenetetramine or an alkylolated triazone derivative) and curing the component B simultaneously with the thermal forming of the mixture to a prescribed form. The component B is preferably a sulfomethylated cocondensation product of a polyhydric phenol (especially an alkylresorcinol), a monohydric phenol and/or an amino compound monomer and an

aldehyde and/or an  
aldehyde donor.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] this invention relates to the structure material used for the interior materials for vehicles, such as an automobile, a building material, etc.

[0002]

[Description of the Prior Art] While phenol resin is conventionally mixed as a binder to a synthetic fiber, a glass fiber, woody fiber, a regenerated fiber, etc. and hot forming is carried out to a predetermined configuration as this kind of structure material, the thing which made this phenol resin harden is offered.

[0003]

[Problem(s) to be Solved by the Invention] However, the curing temperature of the phenol resin as a binder was an elevated temperature below and over 200 degrees C, is difficult to fabricate scarce mounting material etc. simultaneously in piles to the thermal resistance [ like / the luminous efficacy of heat energy in a manufacturing process is bad, and / a poly-polyvinyl chloride leather or a polypropylene nonwoven fabric ] it is, and had a possibility that fiber etc. might deteriorate with the elevated temperature at the time of molding. Furthermore, the hardened material of phenol resin was too hard, and had a brittle defect. Furthermore, the conventional structure material needs to enlarge a density, in order to acquire rigidity, for the reason, the weight of structure material becomes large, and in using especially structure material as an interior material of a vehicle, this poses an important problem.

[0004]

[Means for Solving the Problem] this invention consists of a hardened material of the polyhydric phenol and aldehyde system condensate which is binding the mixed fiber and this fiber of a hemp fiber independent or hemp fiber, and other fiber as a means for solving the above-mentioned conventional technical problem, and offers the structure material currently fabricated by the predetermined configuration. Above-mentioned polyhydric phenol and aldehyde system condensate are condensates with a polyhydric phenol, an aldehyde, and/or an aldehyde donator, or is a copolycondensation object of a polyhydric phenol, 1 \*\* phenol and/or an amino \*\*\*\*\* monomer, and an aldehyde and/or an aldehyde donator. the above-mentioned structure material -- hemp fiber -- or [ adding a curing agent for a polyhydric phenol and an aldehyde system condensate in the independent or mixed fiber of hemp fiber and other fiber ] -- or while it is made to exist and hot forming is carried out to a predetermined configuration, without adding, it is manufactured by the technique of making this condensate harden. Furthermore, in this invention, the interior material for vehicles which made the reinforcing materials the interior material for vehicles which consists of the above-mentioned structure material, and the above-mentioned structure material, and carried out the laminating to base materials, such as a synthetic-resin foam, is offered.

[0005] this invention is explained in detail below.

In the polyhydric phenol and aldehyde system condensate of a [polyhydric-phenol] this invention, the polyhydric phenol used for condensation with an aldehyde Although it is independent or two or more sorts of mixture of polyhydric phenols, such as a resorcinol, an alkyl resorcinol, pyrogallol, a catechol, an alkyl catechol, hydroquinone, alkyl hydroquinone, a phloroglucine, a bisphenol, and dihydroxy naphthalene A resorcinol or an alkyl resorcinol is desirable among these polyhydric phenols, and especially a desirable thing is an alkyl resorcinol with the reaction rate quicker than a resorcinol with an aldehyde. As the above-mentioned alkyl resorcinol, for example 5-methyl resorcinol, 5-ethyl resorcinol, 5-propyl resorcinol, a 5-n-butyl resorcinol, 4, 5-dimethyl resorcinol, 2, 5-dimethyl resorcinol, 4, 5-diethyl resorcinol, 2, 5-diethyl resorcinol, There are 4, 5-dipropyl resorcinol, 2, 5-dipropyl resorcinol, a 4-methyl-5-ethyl resorcinol, a 2-methyl-5-ethyl resorcinol, a 2-methyl-5-propyl resorcinol, 2 and 4, a 5-trimethyl resorcinol, 2 and 4, a 5-triethyl resorcinol, etc. Since the polyhydric-phenol mixture obtained by dry distillation of the Estonia \*\* oil shale contains the various high alkyl resorcinols of reactivity besides 5 \*\*\*\*\* resorcinol so much cheaply, it is the most desirable polyhydric-phenol raw material to this invention.

[0006] With the aldehyde and/or aldehyde donator which are used in a [aldehyde and/or aldehyde donator] this invention An aldehyde and/or the compound which will carry out generation supply of the aldehyde if it decomposes are meant. Formalin, formaldehyde, a paraformaldehyde, a trioxane, An acetaldehyde, a propionaldehyde, a polyoxymethylene, a trichloroacetic aldehyde, A hexamethylenetetramine, a furfural, glyoxal, n-butylaldehyde, Independent or two or more sorts of mixture, such as a caproaldehyde, an allyl-compound aldehyde, the Benz aldehyde, a crotonaldehyde, an acrolein, a tetrapod oxy-methylene,

a phenylacetaldehyde, o-torr aldehyde, and a salicylaldehyde, are illustrated.

[0007] In a [acid-catalyst and alkali catalyst] this invention, in the case of the copolycondensation of the polyhydric phenol in the case of condensation with a polyhydric phenol, an aldehyde, and/or an aldehyde donator and/or a polyhydric-phenol system condensate, 1 \*\* phenol, 1 \*\* phenol system condensate, an amino \*\*\*\*\* monomer and/or amino \*\*\*\*\* monomer, and an aldehyde and/or an aldehyde donator, if required, an acid catalyst or an alkali catalyst will be added. The addition is or less several percent of the weight of the total amount of a polyhydric phenol, 1 \*\* phenol, and/or an amino \*\*\*\*\* monomer, and is usually an amount below 6 % of the weight (it only considers as % below). As the above-mentioned acid catalyst, for example A hydrochloric acid, a sulfuric acid, an orthophosphoric acid, a way acid, oxalic acid, Formic acid, an acetic acid, a butyric acid, a benzenesulfonic acid, a phenolsulfonic acid, Para toluenesulfonic acid, Inorganic or organic acids, such as a naphthalene-alpha-sulfonic acid and a naphthalene-beta-sulfonic acid, Or the ester of organic acids, such as oxalic acid dimethyl ester, a maleic-acid anhydride, Acid anhydrides, such as a phthalic-acid anhydride, an ammonium chloride, an ammonium sulfate, An ammonium nitrate, an ammonium oxalate, an ammonium acetate, ammonium phosphate, Ammonium salts, such as an ammonium thiocyanate and imido sulfonic-acid ammonium, Organic halogenides, such as monochloroacetic acid and its specific-salt, alpha, and alpha' dichlorohydrin, There are urea adducts, such as a hydrochloride of aminess, such as a triethanolamine hydrochloride and an aniline hydrochloride, a salicylic acid urea adduct, a stearin acid urea adduct, and an oenanthic-acid urea adduct, an N-trimethyl taurine, a zinc chloride, ferric chloride, etc. As the above-mentioned alkali catalyst, aminess, such as the weak-acid salts of alkali metal, such as an oxide of alkaline earth metal, such as a hydroxide of alkali metal, such as a sodium hydroxide, a potassium hydroxide, a barium hydroxide, and a calcium hydroxide, or alkaline earth metal and lime, a sodium carbonate, a sodium sulfite, sodium acetate, and a sodium phosphate, ammonia, a trimethylamine, a triethylamine, a triethanolamine, a hexamethylenetetramine, and a pyridine, are illustrated, for example. The above-mentioned acid catalyst or an alkali catalyst may use two or more sorts together.

[0008] The polyhydric phenol and aldehyde system condensate used in a polyhydric phenol and a [aldehyde system condensate] this invention as a binder of the mixed fiber of a hemp fiber independent or hemp fiber, and other fiber The above-mentioned polyhydric phenol, the above-mentioned aldehyde, and/or an aldehyde donator under the above-mentioned acid or alkali catalyst presence Or independent or two or more sorts of mixture of a condensate which were made to condense without presence of a catalyst, Or about a polyhydric phenol, 1 \*\* phenol, an amino \*\*\*\*\* monomer and an aldehyde, and/or an aldehyde donator, are under an acid or alkali catalyst presence, or he has no presence of a catalyst. They are two or more sorts and that the above-mentioned copolycondensation object is independent or two sorts or more with independent or two or more sorts of mixture or the above-mentioned condensate with the independent or copolycondensation object which is under heating or carried out the copolycondensation at the room temperature of mixture. Moreover, even if sulfo methylation of the above-mentioned condensate or the copolycondensation object is carried out by the sulfo methylation agent, it may not interfere, and it may carry out the complexing of the polyhydric phenol by the complexing agent in the case of condensation of the above-mentioned condensate or a copolycondensation object. Moreover, in case of the copolycondensation of the above-mentioned polyhydric phenol, 1 \*\* phenol, and/or an amino \*\*\*\*\* monomer, you may use the initial condensate with a polyhydric phenol, 1 \*\* phenol, an amino \*\*\*\*\* monomer and an aldehyde, and/or an aldehyde donator for a part or all of the above-mentioned monomer. If the polyhydric phenol and aldehyde system condensate of this invention are illustrated, a polyhydric phenol and an aldehyde condensate, 1 \*\* phenol, a polyhydric phenol and an aldehyde copolycondensation object, a urea, a polyhydric phenol and an aldehyde copolycondensation object, A melamine, 1 \*\* phenol, a polyhydric phenol and an aldehyde copolycondensation object, A melamine, 1 \*\* phenol, a polyhydric phenol, and an aldehyde copolycondensation object, They are these sulfos methylation objects, such as a urea, a melamine, a polyhydric phenol and an aldehyde copolycondensation object, and a urea, a melamine, 1 \*\* phenol, a polyhydric phenol, an aldehyde copolycondensation object, or a complexing object of those. In order to obtain the copolycondensation object with a polyhydric phenol, 1 \*\* phenol, an amino \*\*\*\*\* monomer and an aldehyde, and/or an aldehyde donator To a polyhydric phenol, a polyhydric phenol and an aldehyde system condensate and 1 \*\* phenol, 1 \*\* phenolaldehyde system condensate, an amino \*\*\*\*\* monomer, and/or an amino \*\*\*\*\* monomer aldehyde condensate Although the technique of adding and carrying out the copolycondensation of an aldehyde and/or the aldehyde donator is desirable if required, the addition sequence etc. is arbitrary and usually condenses about 1 to 24 hours at room temperature -100 degree C. Moreover, addition mixture of a polyhydric phenol and/or a polyhydric phenol, and the aldehyde condensate is carried out, and if 1 \*\* phenolaldehyde condensate, the part, or all by which a part or all is methylol-ized is still required for methylol-izing or the amino \*\*\*\*\* monomer aldehyde condensate formed into the methylation methylol, they will add and carry out the copolycondensation of an aldehyde and/or the aldehyde donator to it. The polyhydric phenol and aldehyde system condensate of this invention In moreover, when [ condensation or when a copolycondensation is carried out ] In addition to a polyhydric phenol, 1 \*\* phenol, an amino \*\*\*\*\* monomer, an aldehyde and/or an aldehyde donator, a condensation catalyst, a solvent, a sulfo methylation agent, and a complexing agent, as a third component a request -- if -- toluene, a xylene, a cumarone, a cyclohexanone, and casew oil -- Tannin, \*\*\*\*\* a shellac, rosin or a rosin derivative, a petroleum resin, A methanol, ethanol, an isopropanol, n-butanol, an isobutanol, That ethylene glycol, a diethylene glycol, a polyethylene glycol, a glycerol, furfuryl alcohol, the linseed oil, tung oil, castor oil, etc. are independent or two sorts or more are made into a copolycondensation agent or a modifier. At the time of reaction start of condensation or a copolycondensation, among a reaction or after a reaction end, it adds, and even if it denaturalizes, it does not interfere. Moreover, even if it uses the polyhydric phenol and aldehyde system condensate of this invention as solid-state

powder which carried out the solidification drying grinding by technique, such as precipitation xeransis of the resin by ordinary temperature or heating vaporization, vacuum evaporation, the spray drier, \*\*\*\*\*, pH adjustment, etc., it does not interfere.

[0009] [1 \*\* phenol] 1 \*\* phenol by which a copolycondensation is carried out to the above-mentioned polyhydric phenol A phenol, o-cresol, m-cresol, p-cresol, ethylphenol, iso-propyl phenol, A xylanol, 3, 5-xylanol, butylphenol, t-butylphenol, Alkylphenols, such as a nonyl phenol, o-fluorophenol, m-fluorophenol, p-fluorophenol, o-chlorophenol, m-chlorophenol, p-chlorophenol, o-\*\*\*\*\* phenol, m-\*\*\*\*\* phenol, p-\*\*\*\*\* phenol, o-iodine phenol, m-iodine phenol, p-iodine phenol, ortho aminophenol, m-aminophenol, para aminophenol, ortho nitrophenol, Independent or two or more sorts of mixture of 1 \*\* phenols, such as 1 \*\* phenol substitution products, such as m-nitrophenol, p-nitrophenol, a 2, 4-dinitrophenol, 2 and 4, and 6-trinitrophenol, and a naphthol, are said.

[0010] [amino \*\*\*\*\* monomer] The amino \*\*\*\*\* monomer by which a copolycondensation is carried out to the above-mentioned polyhydric phenol means independent or two or more sorts of mixture of amino \*\*\*\*\* which carry out a condensation reaction to aldehydes, such as a carbamide and/or an amino azine, and generate the resin of hardenability, and a urea, thiourea, a melamine, a thio melamine, a dicyandiamide, guanidine, a guanamine, acetoguanamine, benzoguanamine, 2, the 6-diamino -1, 3-diazine, etc. are illustrated."

[0011] [Sulfo methyl agent] If above-mentioned polyhydric phenol and aldehyde system condensate are required in 1 \*\* phenol, a polyhydric phenol, or an amino \*\*\*\*\* monomer and an aldehyde condensation or in case a copolycondensation is carried out, it can add a sulfo methylation agent, it can carry out sulfo methylation of a condensate or the copolycondensation object partially, and can improve the water solubility by the side of neutrality and acidity, and can make it a cure rate delayed. As this sulfo methylation agent, the alkali-metal salt of hydroxy alkane sulfonic acids, such as a water-soluble sulfite with quaternary amines, such as a sulfurous acid, a pile sulfurous acid or a meta-pile sulfurous acid, alkali metal or a trimethylamine, and benzyl trimethylammonium, or the fourth class ammonium and hydroxy methanesulfon acid chloride obtained by the reaction of these water-soluble sulfites and aldehydes, and/or a hydroxy alkane sulfonic acid etc. is illustrated.

[0012] The complexing agent of the polyhydric phenol and aldehyde system condensate of a [complexing-agent] this invention is used in order to ease the reactivity of a polyhydric phenol and an aldehyde, it is a thing, the compound which has a ketone group or an amide group etc. which has complexing organization potency to the hydroxyl of a polyhydric phenol as such a complexing agent is raised, for example, an acetone, a caprolactam, etc. are illustrated, and especially an acetone is a desirable complexing agent.

[0013] Although the indifferent water is used as a solvent used for this solution although the polyhydric phenol and aldehyde system condensate of a [solvent] this invention are mainly offered in the state of a solution, if required, independent or two or more sorts of mixture of water fusibility organic solvents, such as ketones, such as alcohols, such as a methanol, ethanol, an isopropanol, n-butanol, ethylene glycol, a diethylene glycol, and a polyethylene glycol, an acetone, and a methyl ethyl ketone, can also be used. While an acetone etc. is a solvent, it acts also as a complexing agent of an alkyl resorcinol, and brings a quieter hardening reaction. However, powdered polyhydric phenol and aldehyde system condensate which grinds a hardened by drying by drying part which removes a solvent by technique, such as a reduced pressure drying, and was obtained in the above-mentioned solution, and is obtained in this invention are also used.

[0014] To the polyhydric phenol and aldehyde system condensate of this invention besides the [third-component] above-mentioned component, if it is a request, a monohydric phenol, Amino \*\*\*\*\* monomers, such as a polyhydric phenol, a urea, thiourea, a melamine, and a thio melamine, Amino resins, such as 1 \*\* phenol system resin, a urea system resin, and a melamine system resin, Natural rubber and its derivative, a styrene butadiene rubber, acrylonitrile-butadiene rubber, Synthetic rubber, such as chloroprene rubber, ethylene-propylene rubber, polyisoprene rubber, and isoprene-isobutylene rubber, Vinyl acetate, a propionic-acid vinyl, styrene, acrylic ester, methacrylic ester, Acrylonitrile, an acrylic acid, a methacrylic acid, a maleic acid, a vinyl chloride, Two or more sorts of copolymers (the homopolymers of vinyl monomers, such as a vinylidene chloride and a \*\*\*\*\* pyridine, or these vinyl monomers),

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